THE VISUAL DISPLAY OF
QUANTITATIVE INFORMATION
EDWARD R. TUFTE

UNDERSTANDING

OF ELECTRICAL ENGNEERS

As an individual, through the Institution, you can:

- get careers advice
- speak to an engineer
- visit industry
- attend

As an organ

- work with engine
- have engineers attend events
- attend lectures
- get support with curriculum development
- receive Electronics Education
- be part of the IEE mailing list.

HOW TO BECOME A GRADU

A Levels/H Grades
Maths, Science

Minimum

GCSE/S or
Standard Grade,
including English
Maths, Science

ertificate

Scotvec
onal
Diploma/Certificate

YOUNG ENGINEER FOR BRITAIN 1991

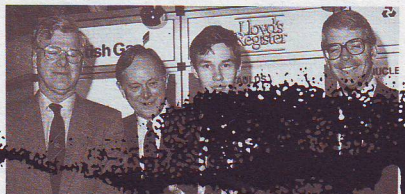
In organising the "Young Engineer for Britain" competition, the Engineering Council hopes to encourage young people to undertake en work and to strengt and industry.

The 1991 title wa off by 18 year old Adam Seed from Oldbury Wells School, Bridg Shropshire. Adam won the coveted trophy and £1,250 for his school with his invention called Drill-Mate, a fitting for an electric drill enabling accurate drilling at different angles. It uniquely incorporates the bubble principle used in spirit levels.

Adam, who is going to study engineering, was one of 45 national finalists, aged 11-19, in the competition.

The En Women into Sc award of £50 project by a girl was won young, aged 18, of Wigan, wi ention 'The Young Porter' which e ail elderly people to be transferred fo a bed to a chair with ease.

Nicola, who attended the St. John Rigby Sixth Form College, Wigan, has joined the Royal Navy and is starting a course on marine engineering.



Ari Ercole, an 18-year-old schoolboy, trophy and a ch £600 (s from John Major, the Prin London last month. Mr Er Faraday Prize, for the b electrical or electronic technology, in the Young Engineer for Britain awards. Also pictured (from left) are IEE President David Jones and Sir John Fairclough, Chairman of the Engineering Council.

IEE Trophy Winner

To commemor the birth of Mi inst awarded a pri with a trophy to Ari Ercole, 18, Walton-On-Thames, Surrey project "AC-MHD", an alt current magn to-hydrod generator which to AC electricity. The ght this project exhibited the best use of electrical and electronic engineering principles and techniques.

ELEC

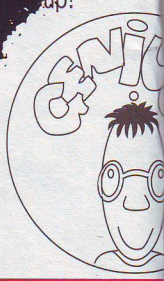
"Engineering is Things are designe the whole of socie should be part of t It's rewar

s is the mess elle Barton, Car gineering Counc

An engineer can different jobs all of theoretical and pra knowledge and use and environmental

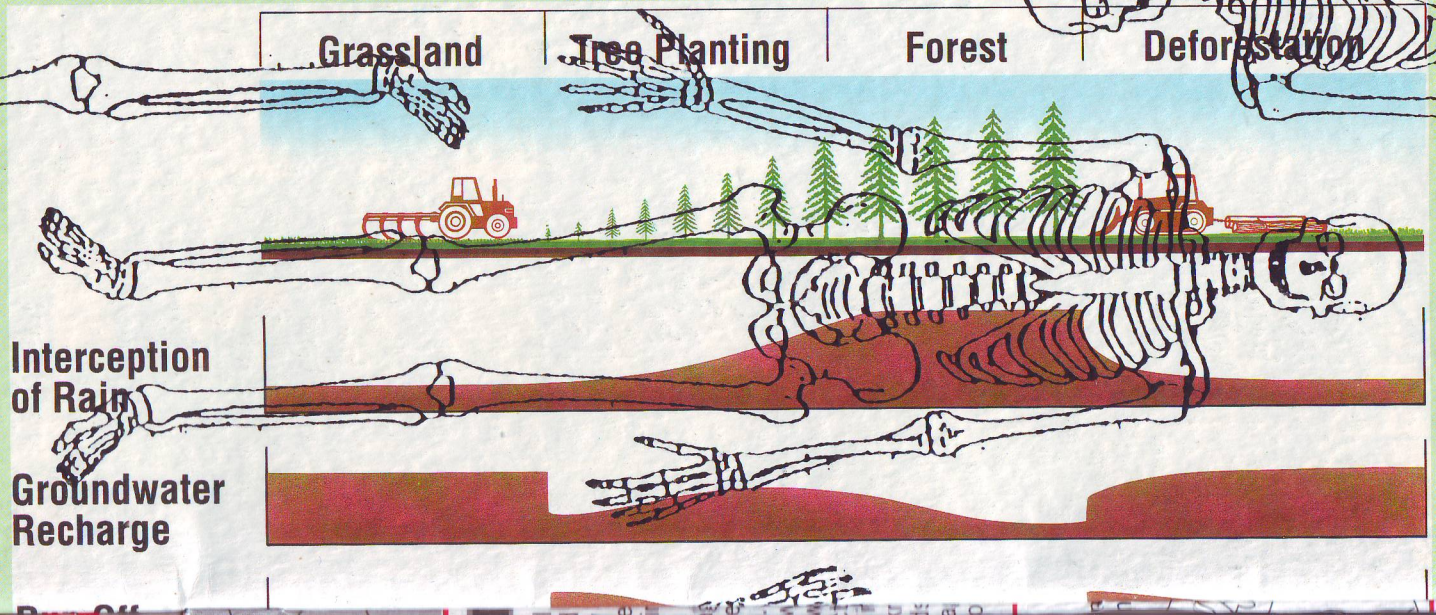
An engineer nee common sense, im ability to work with

ld you like to electr up?



The impact of forestry on water resources

Changes in land use can affect hydrology. Here, the changes of several hydrological parameters are shown diagrammatically through the life of a forest. The growing forest increases the interception of rainfall, but much of this is lost by evaporation. This reduces the amount of streamflow, reduces groundwater recharge but also increases the deposition of atmospheric pollutants which can lead to the acidification of the soil and waters. The risks of flooding may be enhanced during planting and harvesting operations but are reduced during the growth of the forest.



The changing countryside

s typical modern ... landscape (top) ... ing the ... 'desert' ... linking. The ...

*... ies ... ces and ... in the most ... med ... this ... in ... nd vi ... ould ... proposa ... duce ... side ... ... with, ... de ... ... sures, ...

appear, although increasingly they tend to be marginal, irregular, independent productions that don't fit that comfortably into multinational corporate schedules and marketing strategies.

It's tempting to blame the industry in the US and here for the situation. Their attempts to manufacture new adult comics have been dismal failures, either artistically or commercially. Usually they take the safe option, pump up the violence and label the result 'gritty', 'realistic', 'adult'. Alternatively, when they do stray away from proven formulae, they don't have the courage to spend time (and money) developing ideas.

The case of *Revolver* is symptomatic. A news-stand anthology launched in June last year by Robert Maxwell's Fleetway, aimed at a late-teens and early-twenties readership, it had [illegible] December

after failing to hit sales targets. Citing a largely positive response by those who did buy the title, former editor Peter Hogan claims that, given time, the comic could have been successful. He blames Fleetway's pursuit of fast bucks, resistance within the company to the idea of an adult comic, and bewildered distributors and retailers who didn't know what to do with the comic [illegible] hed it on the top shelf rather than next to the music [illegible]

Of course, one reason why [illegible] the absence of good strips. Stuart [illegible] to us later [illegible] magazine *Speakeasy*, agrees. "Perhaps [illegible] nderstanding. Another benefit [illegible] ore time, but its publishers acte[illegible] that [illegible] – they announced a title and t[illegible] it. Things work better when tit[illegible] like *2000 AD* or *Deadline*. Really, [illegible] the strips were far too safe."

Green is currently putting toget[illegible] which will feature new strips and previously pu[illegible] celebrated material which he feels deserves a wider audience. *Toxic*, another new title, is creator-controlled, and features established hits such as Alan Grant and John Wagner's Bogart pastiche *The Bogie Man*, and Pat Mills and Kevin O'Neill's grotesque superhero satire *Marshal Law*.

Both hope to avoid *Revolver*'s fate, but both are targeting 14- to

Hard Boiled **– more a doodle than a comic – by artist Geof Darrow and writer Frank Miller (top); comic fans' comic *Eightball* by Daniel Clowes (above)**

DINO-SORE
BURST?
EXTINCT!
BRONTO BREATH
HERE YA COMING!

To date most mobile communication has centred on voice. But while it is possible to provide services such as facsimile and data transmission via the cellular telephone network, it is not the most efficient use of airtime or the most effective way of offering such

[redacted] a voice [redacted] normal [redacted] much longer than [redacted] require [redacted] set it up and therefore [redacted] circuit switching is the predominant technology. In a circuit-switched voice call, radio channels remain allocated throughout its entire duration.

For a data communication call the transmission time for a message is often only a few milliseconds. Using a dedicated channel is therefore wasteful.

Packet switching

A far more efficient method of transmitting data over radio is packet switching. Using this method the data to be sent is divided into packets which are each transmitted separately by the network from the user to the computer system and vice versa.

Couriers, taxi companies, trucking companies and emergency services are the large user groups [redacted] communications needs [redacted] met adequately by voice [redacted] communication. They all have the problem of receiving incoming information, sorting it and prioritising before relaying it to the appropriate

■ *A taxi driver receives an address from the radio printer*

The Swedish Vasteras Taxi Company is a corporation with 45 affiliated companies and a fleet of 94 vehicles. It has been using mobile data for booking and traffic management since 1987.

The company's president, Bjorn Norell, explained that in the early days [redacted] came to a head because it became impossible to handle [redacted] manually. The procedure of [redacted] cars while queues at the [redacted] continued to mount simply [redacted] too inefficient. Now when a customer calls to book a car, the address is [redacted] into the company's booking [redacted] at the traffic management [redacted] the computer the [redacted] hole assignment [redacted] a [redacted] ble vehicle using [redacted] work.

Bjorn Norell said: "Mobile data [redacted] expedited faster and there is little risk of misunderstanding. Another benefit [redacted] that [redacted] been [redacted] a [redacted] has led [redacted] consider [redacted] efficiency [redacted] taxi [redacted] [redacted] location by keying in a code. This tells the computer which cars are available [redacted] various areas. At the traffic [redacted] we also [redacted] cars will be available shortly [redacted] driver keys in a code just [redacted]

the Mobitex Operators Association (MOA) which is an independent association of Mobitex operators throughout the world.

Within the MOA there is a technical committee which produces specifications and makes them available for software application programmers free of charge. Any manufacturer or software developer can develop and market products to the Mobitex standards. This philosophy encourages competition and allows even the smallest companies to

subscribes to the mobile data service in a similar way to cellular subscribers on the cellular network. Mobitex subscribers each have their own unique subscriber number and are billed according to the quantity of services they use, the type of facility they operate and the amount of airtime used.

But a key difference is that subscribers can have either a fixed or mobile connection to the network. Fixed subscriptions are used for the connection of a company's mainframe

plans to operate 523 base stations on 900MHz, providing an 8kbit/s data rate. RAM has licences for nationwide coverage. Commercial operation is due to begin in November 1991.

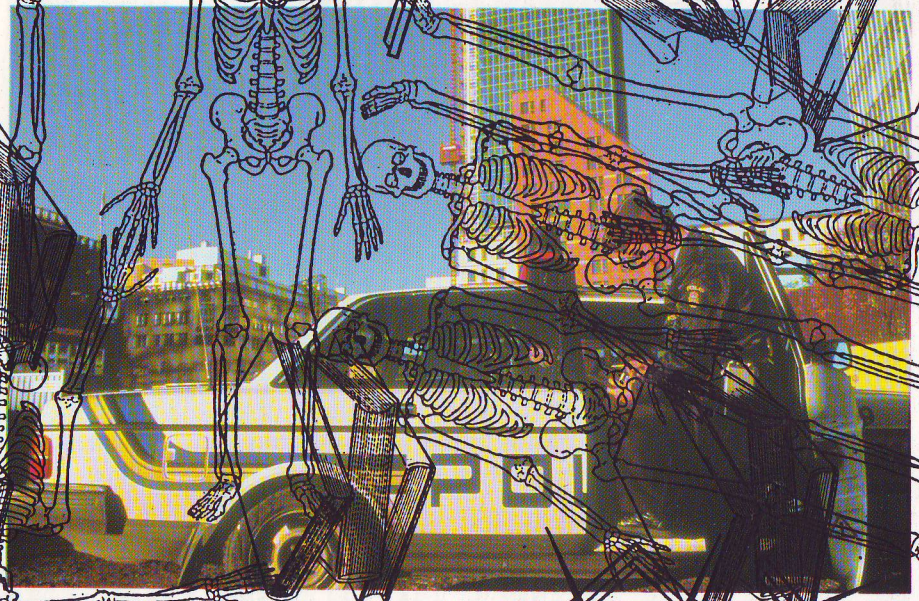
Canada: Cantel Incorporated plans 50 base stations on 900MHz, providing a 4800bit/s data rate. The first phase covers Montreal, Toronto and Windsor. Expansion is now underway to cover Highway West.

Sweden: Swedish Telecom Radio has more than 100 base stations operating on 80MHz and providing a data rate of 1200bit/s. The system has been in operation since 1986 and covers a major part of the population.

Finland: the Helsinki and Oulo PTTs started installation in January 1989. The system operates on 150MHz at 1200bit/s and a nationwide expansion is planned.

Norway: the Norwegian Telecom Authority has Mobitex operating in Oslo, Stavanger, Bergen and Trondheim. The system operates on 160MHz at 1200bit/s and was installed in March 1990.

United Kingdom: Ericsson is supplying its Mobitex network exclusively to RAM Mobile Data which will be the network operator. RAM will have a 4kbit/s Mobitex network operating on 160MHz in the UK in mid-1991.

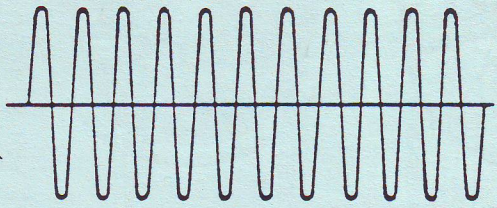


A police officer uses his bar-code reader to scan a driving licence. Using Mobitex, he can call up the driver's records from the central computer.

MOUTH
99%
N.I.L BY MOUTH
self opinionated inc
NIL
MOUTH

Distinguishing characteristics . . .

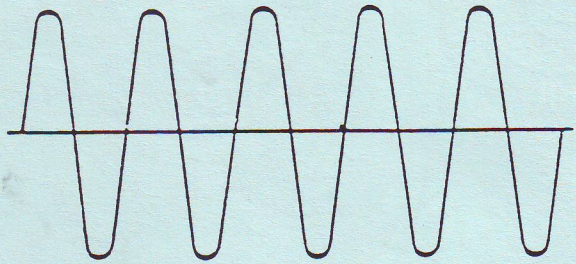
pitch (frequency)



mew high frequency

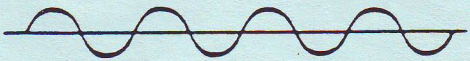
. . . of sound

intensity (loudness)



shout waste gases loud

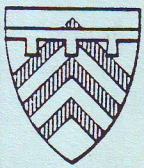
second revolution



soft

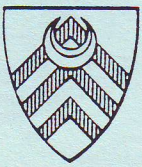
whisper spark ignites mixture

eldest son



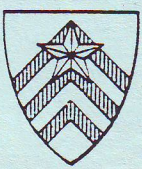
label

2nd son



crescent

3rd son

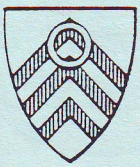


mullet

4th son

martlet

5th son



annulet

STINED TO BECOME 67's
EMOST SOUL EXPONENT!

THE JIMI HENDRIX

EXPERIENCE

"HEY JOE"

0572

ANOTHER SINGLES CHART IMPERATIVE FROM reprise

JEFFERSON

AIRPLANE

Millions read about it in "LOOK"...
Their "Surrealistic Pillow" album is now Top 10...
"Pillow" features their current Top 10 single "Somebody to Love"...
Now, a second great single from the same sensational album:

"WHITE RABBIT"

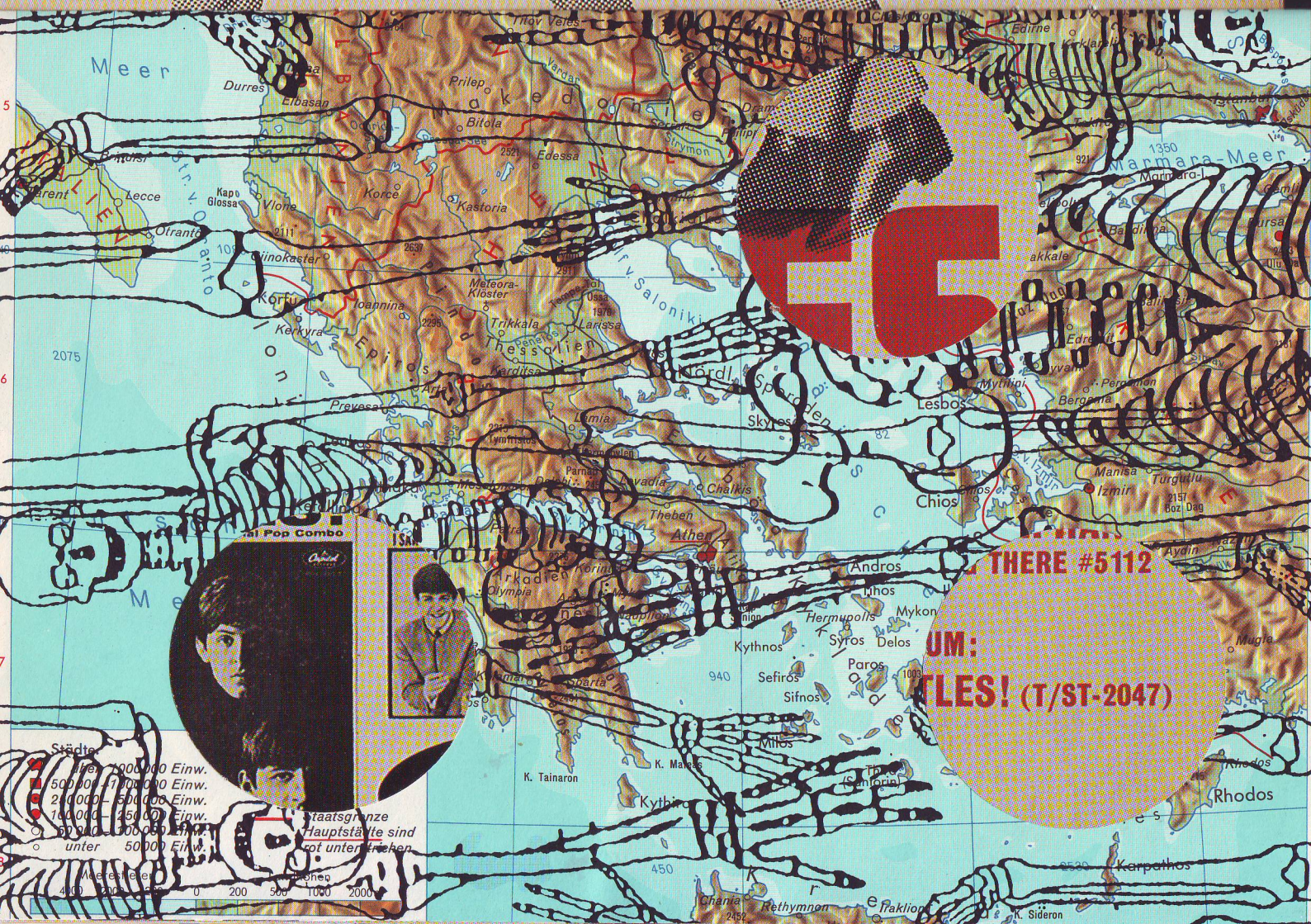
c/w "Plastic Fantastic Lover" #9248

RCA VICTOR

The most trusted name in sound

Album: "Surrealistic Pillow" LPM/LSP-3766

Single: "Somebody to Love" #9



tal Pop Combo

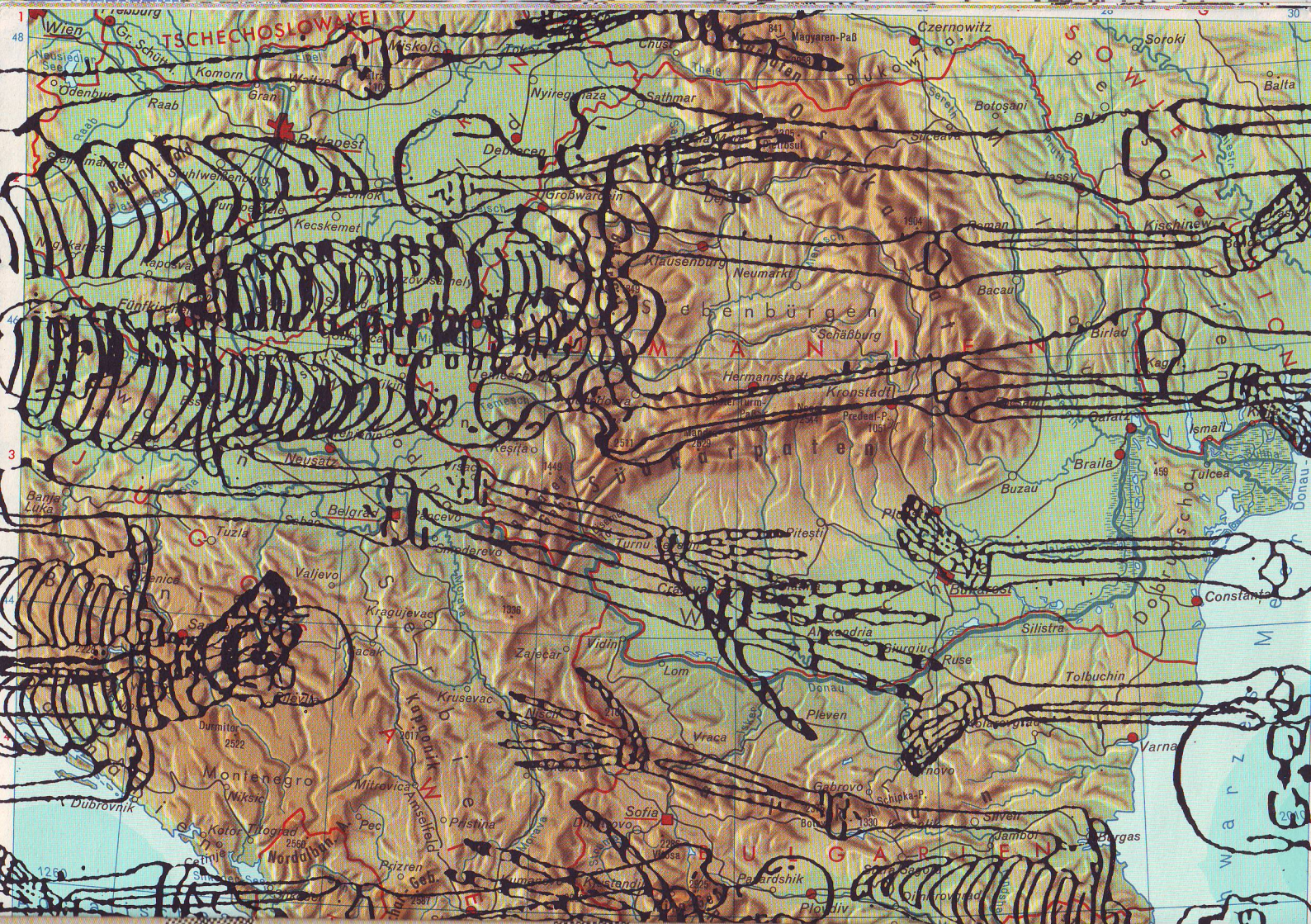
THERE #5112

UM:

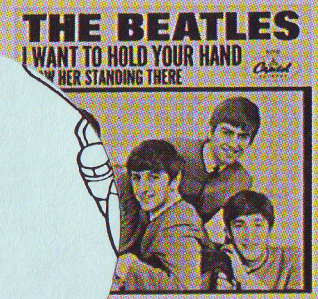
TLES! (T/ST-2047)

Hochstämmiger Wald
Grünlandwirtschaft und Ähnlen
Ackerland in immerfeuchten Gebieten, durchsetzt von Grünland und Wald
Fruchtbares Ackerland in immerfeuchten Gebieten (hohe Weizenerträge)
Ackerland mit starkem Maisanbau
Macchie, Buschwald, karge Schafweide
Fels- und Eisregion der Hochgebirge
Cosenza
Agrigento
Syrakus
Ragusa
Pantelleria
Tunis
Bône
Djerissa
Sousse
Kairuan
Tebessa
Diebel Kuif
Hammam
Mensa
BZ
Ph

Salzburg
Kaprun
Villach
Udine
Idrija
Triest
Agram
Gojilo
Esseg
Como
Cavriaga
Cortemaggiore
Savona
Aosta
Chippis
Luzern
Bern
Zuri
Besan
Genf
Ulm
Augs
Inne
Trient
Bresc
Verona
Pad
Chio
Port
Mod
Bologna
Lai
Bx
BZ
Qu
Ph
S
Zuck
Re
Ta
Ba
Kor
Bauxit
Phosphat
Marmor
Industrie
Hüttenwerke
Maschinenindustrie
Chemische Industrie
Erdölraffinerie
Textilindustrie
Wasserkraftwerk
Fischereihafen


TSCHECHOSLOWAKEI
Wien
Neusiedler See
Gr. Schütt
Miskolc
Komorn
Odenburg
Raab
Gran
Budapest
Debrecen
Kecskemet
Großwardein
Klausenburg
Neumarkt
Sebenbürgen
Schäßburg
Hermannstadt
Kronstadt
Neusatz
Belgrad
Tuzla
Banja Luka
Valjevo
Kragujevac
Zajecar
Vidin
Lom
Donau
Pleven
Vraca
Montenegro
Niksic
Dubrovnik
Kotor
Titograd
Mitrovica
Pec
Pristina
Prizren
Sofia
Gabrovo
Schipka-P.
Silven
Jambol
Burgas
Pazardshik
Plovdiv
Czernowitz
Soroki
Balta
Botosani
Jassy
Roman
Kischinew
Bacau
Birlad
Galatz
Ismail
Braila
Tulcea
Buzau
Ploiesti
Bukarest
Constanta
Silistra
Tolbuchin
Varna
Ruse
Giurgiu
Alexandria
Turnu Severin
Craiova
Pitesti
Rumänien
Donau
Schwarzes Meer
SOWJETUNION
BULGARIEN
Magyaren-Paß
Nyiregyhaza
Sathmar
Chust
Theiß
Bukowina
Serethul
Putna
Pruth
Sereth
Donau-Schwarzmeer-Kanal

BEATLES!



Capitol
REG U.S. PAT. OFF.
RECORDS

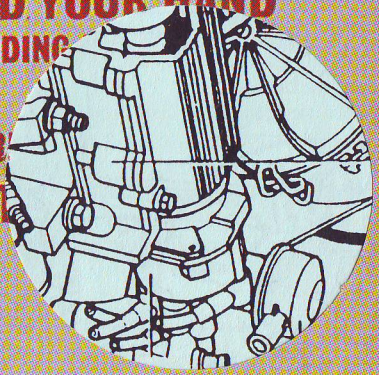
FIRST CAPITOL SINGLE:

I WANT TO HOLD YOUR HAND

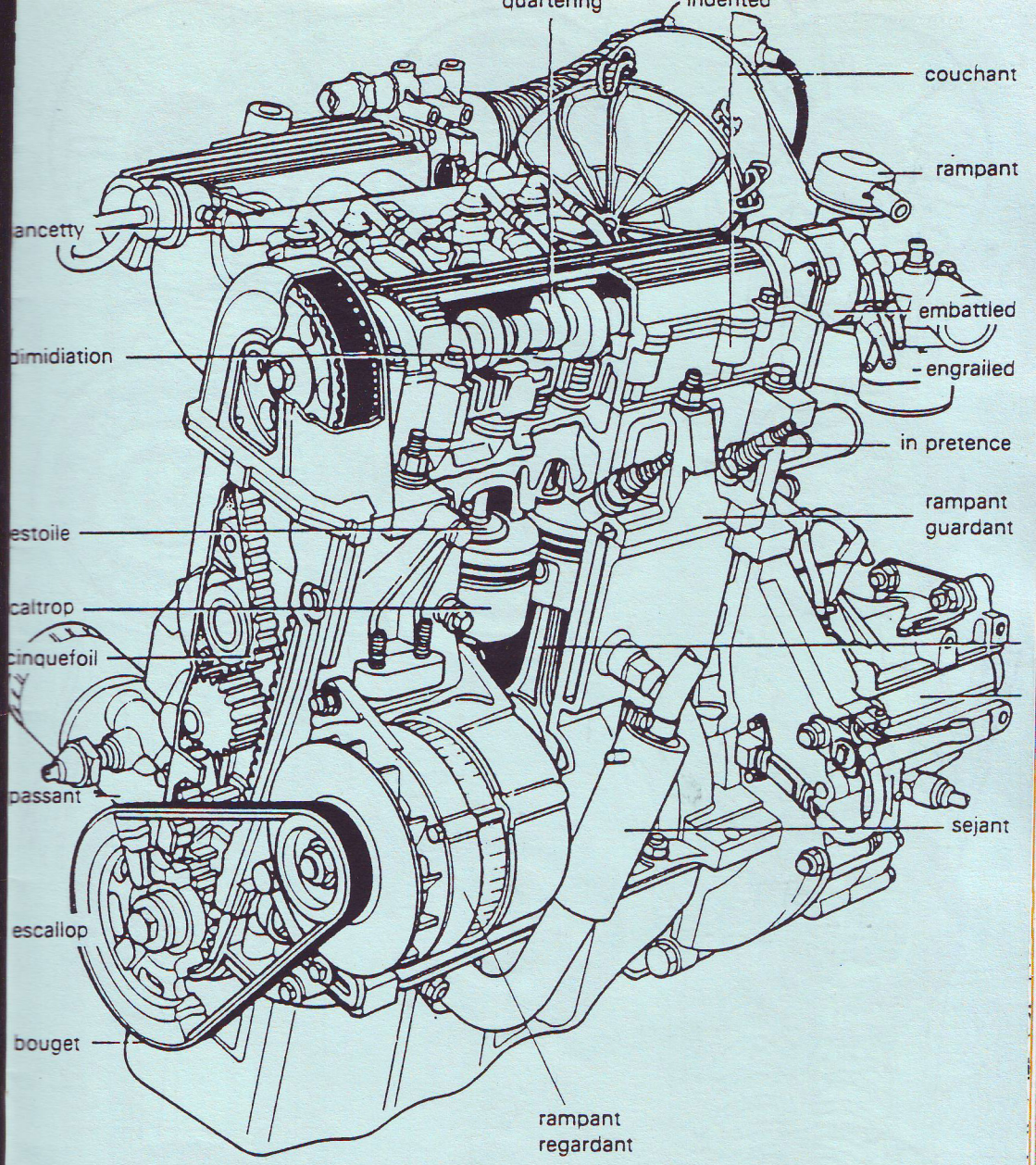
b/w I SAW HER STANDING

FIRST CAPITOL ALB

MEET THE BEAT



PICTURE BY MICHAEL JUSEF



first revolution

6th son

fleur-de-lis

7th son

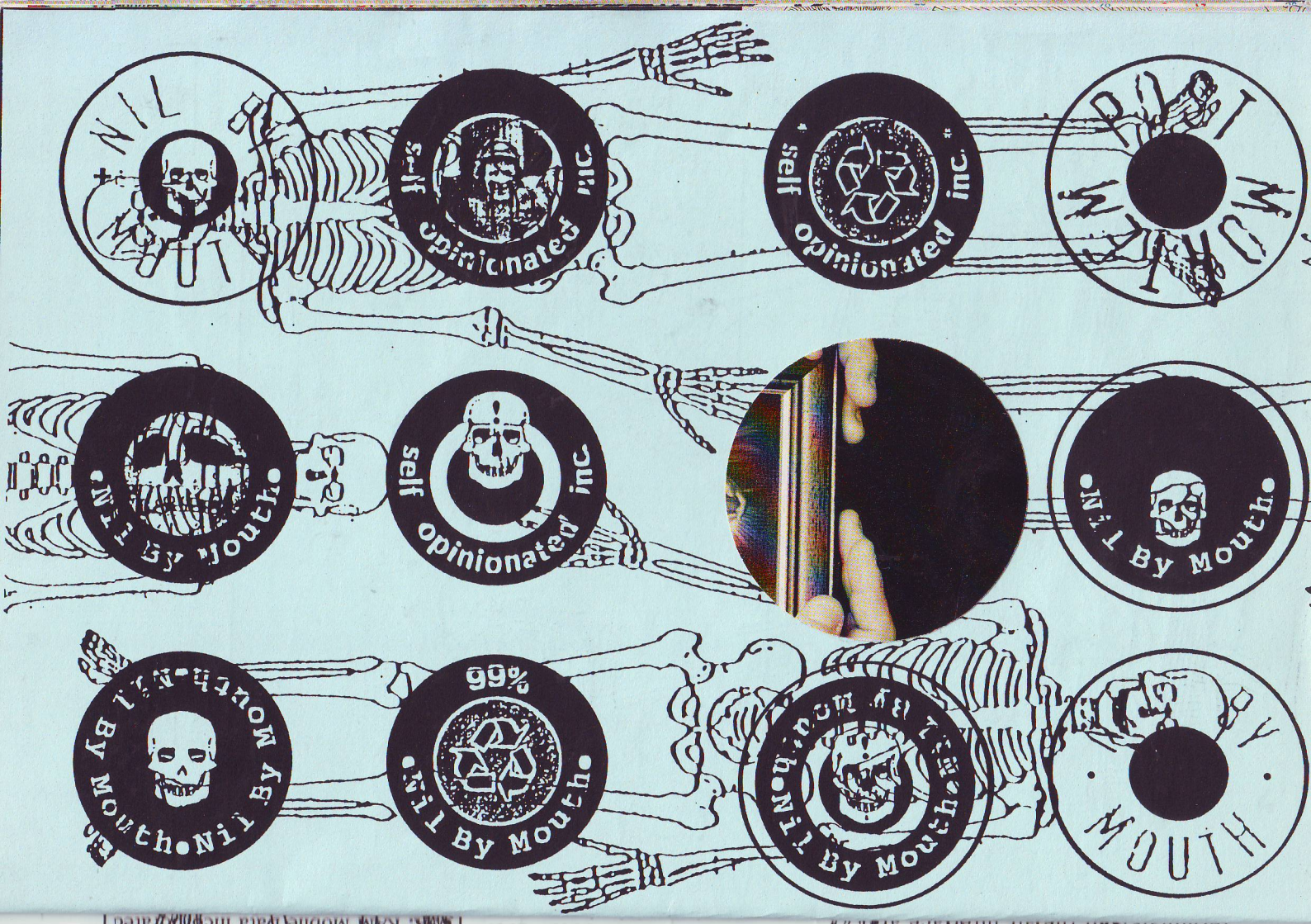
rose

8th son

cross moline

9th son

double quatrefoil

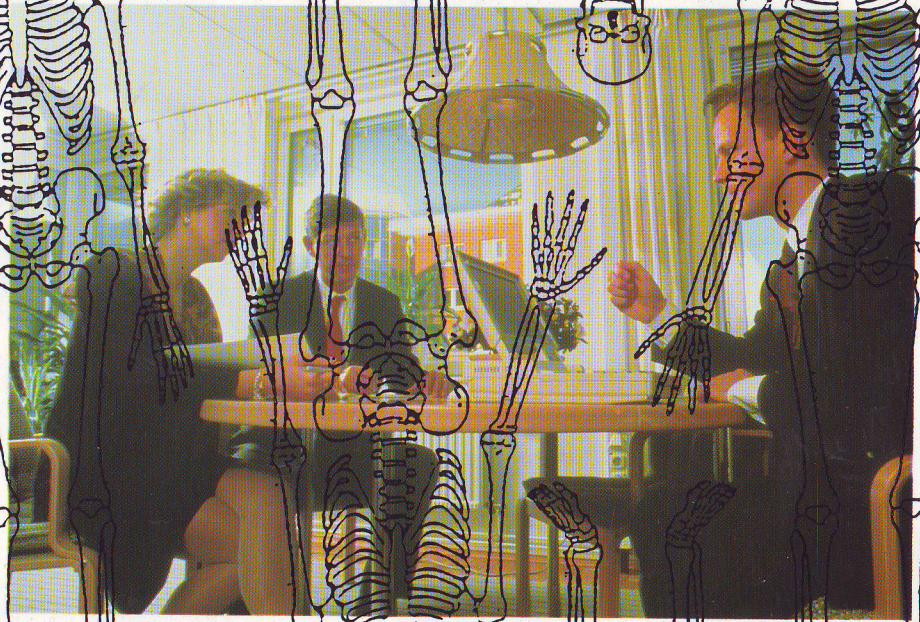

NIL BY MOUTH
self opinionated inc.
self opinionated inc.
NIL BY MOUTH
NIL BY MOUTH
self opinionated inc.
NIL BY MOUTH
NIL BY MOUTH
99%
NIL BY MOUTH
NIL BY MOUTH
NIL BY MOUTH

the airtime used is only a few tenths of a second.

Data also has the advantage that it can be printed and stored for later retrieval, thus minimizing the risk that a message will be forgotten or misinterpreted.

It was in an effort to meet the data communication needs of mobile users that Ericsson developed its digital mobile data communications system, Mobitex. This product is the result of joint development work carried out in Sweden by Ericsson and the Swedish telecommunications administration. The two organisations formed a joint development company, Eritel, in the early 1980s.

Originally the idea was to develop a mobile data system for Swedish Telecom's field engineers. In 1986 the first trial system started running in Sweden but it was soon realised that there was huge worldwide potential for a public mobile data system.



■ *This salesman can link up with his company's computer and examine stock levels or place an order direct*

Mobitex – an open standard

According to Ericsson, Mobitex is a truly open standard. Specifications for terminals and the air interface are

participate in development of specialist applications and competitive terminals. It also means that mobile data software and hardware developers, who produce products to the Mobitex standard have a worldwide market.

A Mobitex mobile data user

Mobitex around the world

USA: RAM Mobile Data Inc. initiated

Steve … Ericsson … the … tem

MOBILE
Handling mobile d…

ADVANCES in … mobile unit. This has traditionally been … typically these users send short
… technology ha… undertaken by a … using … between mobile … its and
… many applic… voice communicati… and manual … the base – for ex… ple,
eliminate … the … ed for fix… systems. … al status message… and
nections … fic… mputer … With mobile data, … pa… of this … communication take… ce
Mobile d… co… unicatio… process can be aut… te… aving … ce, the communic… ns
changing … w… n which … …adio ope… or … e and … orld be …cupied … 30
and manu… compa… …ing speed and … ut with a d…
service … and uti…
business.

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ca… can …
inte… …yste…
mob… …. They …
effic… …t of transp… …g
info… … will re… …e
… …y, quickly and
… …imum of human
…

CONSIDER YOURSELF...

Ericsson

◀ likes of *Black Kiss*, *Crisis*, or the wors
underground comics, it's not hard to se
You can see how it would be an easy st
write – rather t fact.

The re omics is more
confus ginal excite-
men *The Dark*
Knic *Watchmen*
has e slew of
doc nihilism
and appli mytholo-
gy. M eliminate he d for fi
nections fic mputer
one o Mobile d co unicat mal experi-
ments tanging w n whividends (Alan
Moore's chac nanu ic *Big Numbers*);
drifting close to self-parody (Neil Gaiman, even the Hernandez brothers); or treading water (Frank Miller's *Hard Boiled* and *Give Me Liberty*, the new revamped *Deadline*, still relying too much on the fading charms of Jamie Hewlett's trademark mix of cheek, chic and naked babes).

But it's stupid just to write the medium off as another Eighties success story gone bad in the Nineties. It's unreasonable to expect a *Killing*

Sediment, pesticides and
fertiliser run-off reduces water
quality in streams and rivers.
Network of hedges
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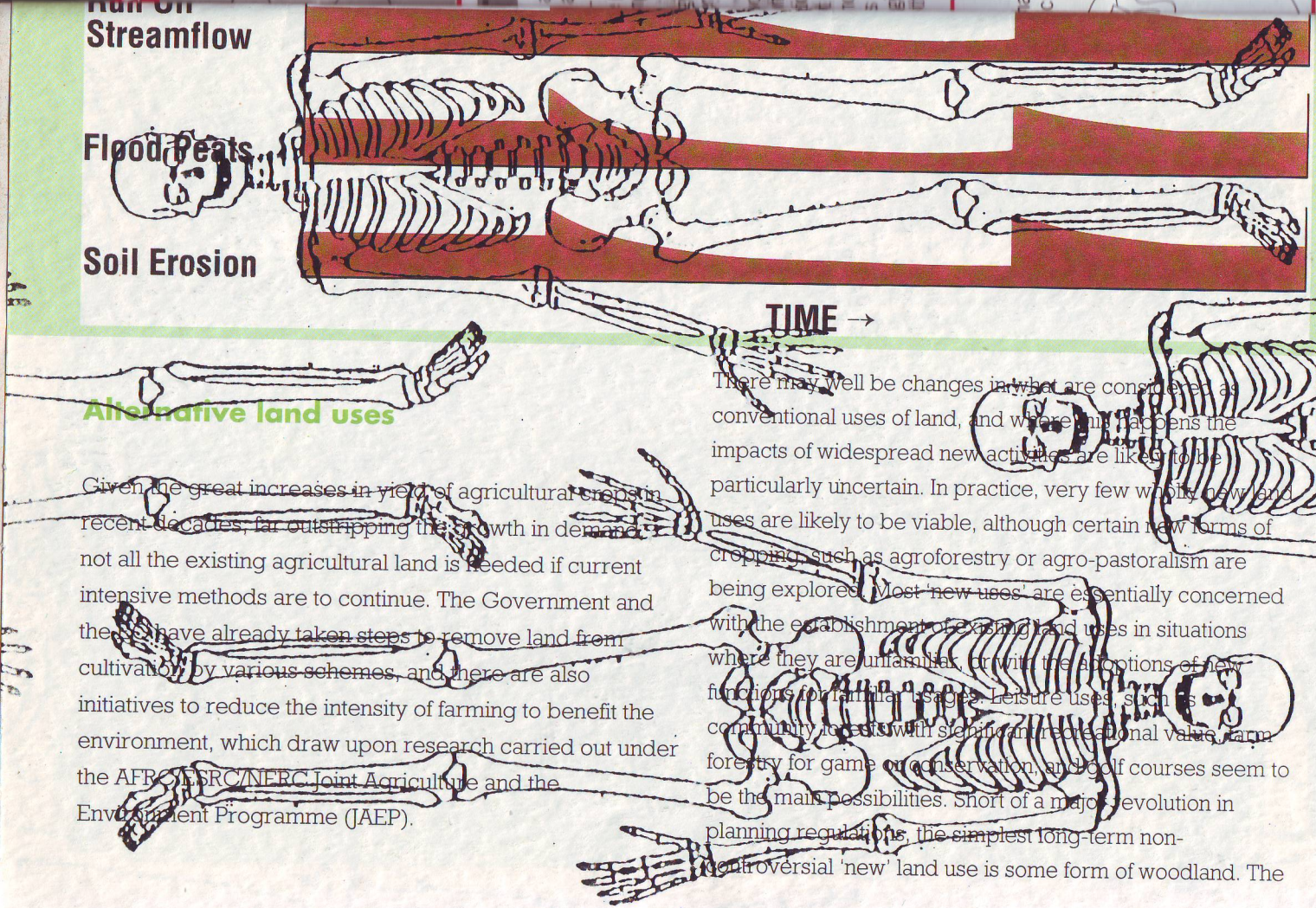
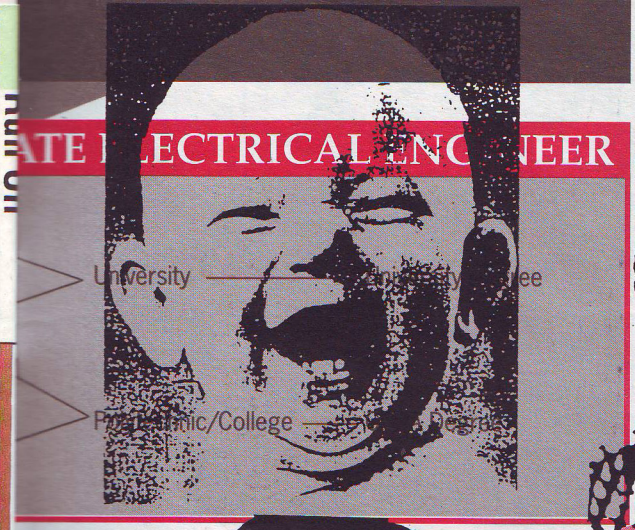
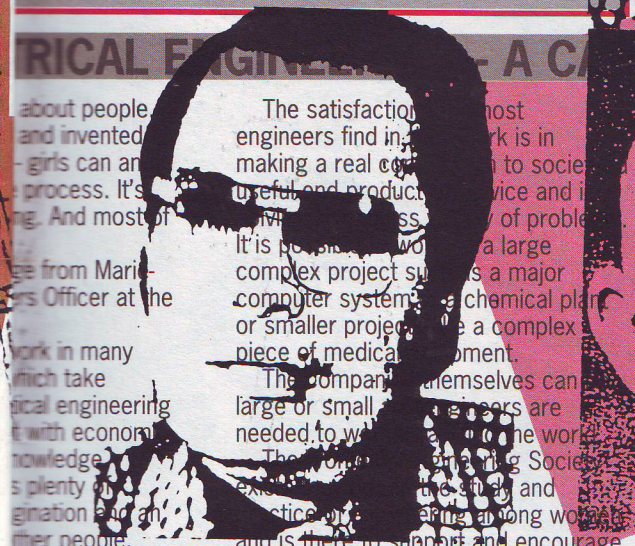


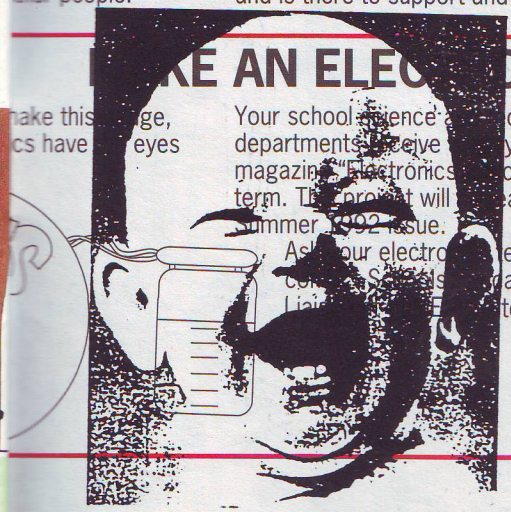
Alternative land uses

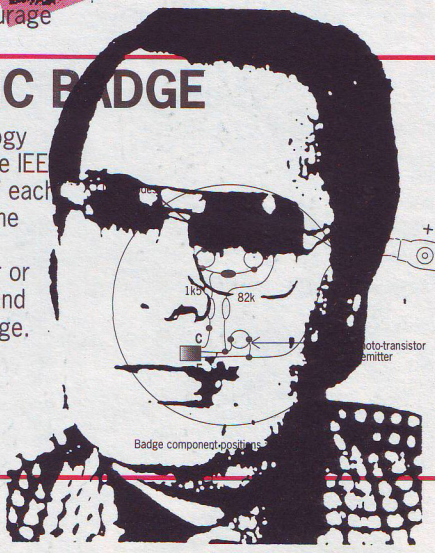
Given the great increases in yield of agricultural crops in recent decades, far outstripping the growth in demand, not all the existing agricultural land is needed if current intensive methods are to continue. The Government and the EC have already taken steps to remove land from cultivation by various schemes, and there are also initiatives to reduce the intensity of farming to benefit the environment, which draw upon research carried out under the AFRC/ESRC/NERC Joint Agriculture and the Environment Programme (JAEP).

There may well be changes in what are considered as conventional uses of land, and where they happens the impacts of widespread new activities are likely to be particularly uncertain. In practice, very few wholly new land uses are likely to be viable, although certain new forms of cropping, such as agroforestry or agro-pastoralism are being explored. Most 'new uses' are essentially concerned with the establishment of existing land uses in situations where they are unfamiliar, or with the adoptions of new functions to familiar usages. Leisure uses, such as community forests with significant recreational value, farm forestry for game or conservation, and golf courses seem to be the main possibilities. Short of a major revolution in planning regulations, the simplest long-term non-controversial 'new' land use is some form of woodland. The









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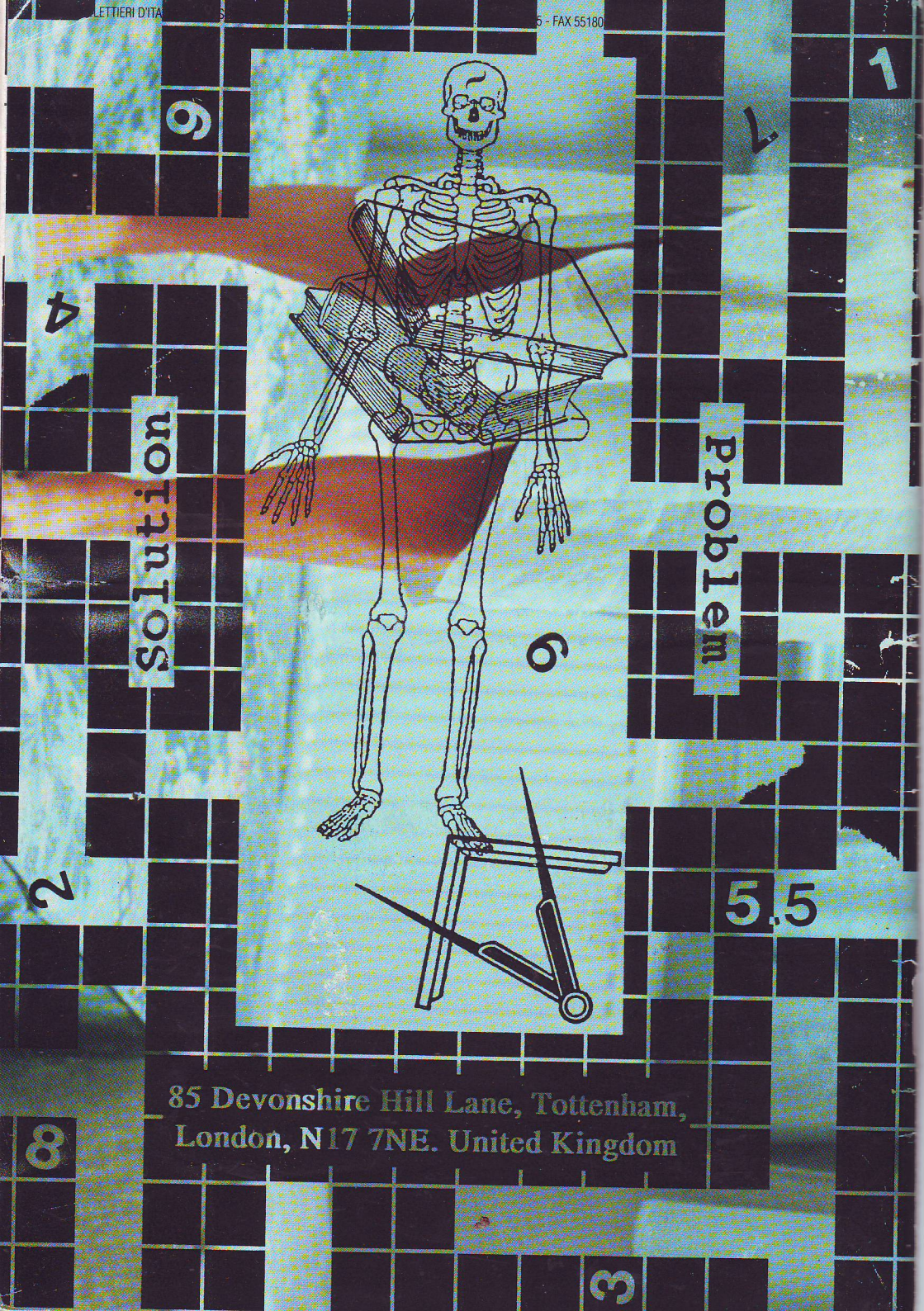

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